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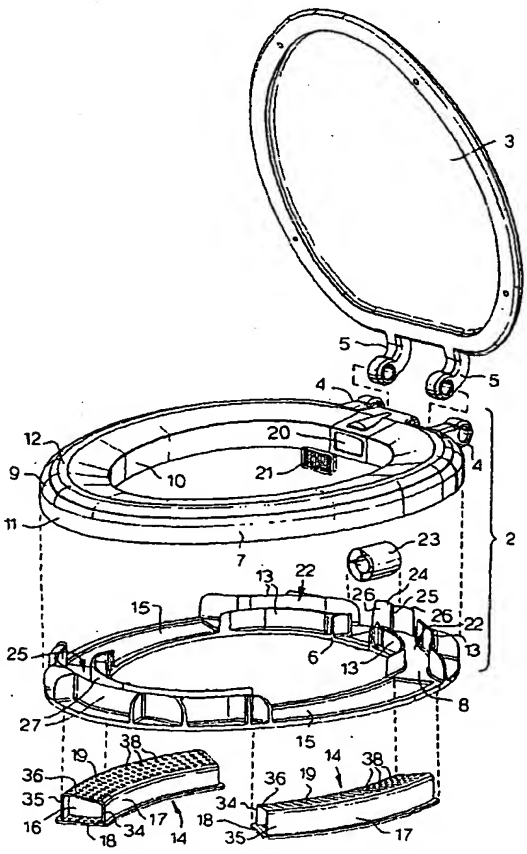

(57) Abstract: A toilet seat (1) comprises an annular seat member (2) having two air filters (16) for deodorising foul air from a toilet pan, each arranged in ducting (22) extending around the annular seat member (2) between an inlet (21) for receiving foul air from the toilet pan and an outlet disposed adjacent the air filter (16). A fan (23) is mounted in the seat member (21) to draw air in through the inlet (21) and create separate air flows in parallel through the ducting (22) over the two air filters (16). An air flow splitter (24) is arranged to split the air blown by the fan (23) into the separate air flows. On the opposite side of the air filters (16) from the fan (23) there is arranged a common cavity communicating with the ducting (22) for both air filters (16). The cavity (25) serves to reduce back pressure and hence improve the filtering efficiency.

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Toilet Seat

The present invention relates in general to deodorising air from a toilet pan using a filter.

Numerous proposals have been made for filtering foul air from toilet pans to deodorise the foul air. There are a number of known systems involving a filter outside the toilet pan, but such systems are bulky and costly, as well as being difficult to fit to the toilet pan. To avoid these problems, it has been suggested to fit a filter in the toilet seat itself, together with a fan to draw air from the toilet pan through the filter. For example, US-5,079,783 discloses such a toilet seat.

However, if a fan and filter are arranged in the toilet seat, there is a significant problem of achieving a sufficient deodorising action. This is because it is undesirable to significantly increase the size of the toilet seat as compared to the normal size for a toilet seat, which places a size limitation on the filter and fan. If the filter is too small, then odours may pass through without being removed. If the fan is too small, for a given size of filter, then there may be insufficient air flow through the filter.

Several aspects of the present invention are concerned with maximising the deodorising action of a filter system arranged in a toilet seat for the purpose of providing a filter system which balances the demands of being effective without unduly increasing the size of the toilet seat.

Another aspect of the present invention is concerned with arranging a system including filters for deodorising foul air from a toilet pan in a toilet seat without detriment to the appearance of the toilet seat.

According to a first aspect of the present invention, there is provided a toilet seat comprising:

an annular seat member;

at least one air filter for deodorising foul air from a toilet pan arranged in ducting extending around the annular seat member between an inlet for receiving foul air from the toilet pan and an outlet disposed adjacent the air filter; and

the fan means arranged in the ducting for creating air flow along the ducting

through the air filter,

wherein the ducting communicates with a cavity on the opposite side of the air filter from the fan means.

As the air filter is arranged in ducting extending around the annular seat member, rather than across the annular seat member, it is possible to maximise the deodorising action. In particular, the length of the filter around the annular seat member may be increased to increase the degree of filtration. As the air flow is around the annular seat member, it is easy to achieve airflow along the entire length of the air filter simply by ensuring that the fan means has sufficient power. This contrasts with ducting arranged across the seat member, for which it becomes difficult to achieve satisfactory air flow through the filter along the entire length around the annular seat member.

According to the present invention, the outlet is disposed adjacent the air filter, but in addition there is a cavity communicating with the ducting on the opposite side of the air filter from the fan means. As such, the cavity is not in the direct flow path between the inlet and the outlet. At first sight such a cavity might appear unnecessary because the direct air flow path from the inlet to the outlet does not pass through the cavity. However, the presence of the cavity in fact improves the deodorising action of the filter. In particular, the cavity has the effect of decreasing back-pressure at the outlet, as compared to no such cavity being provided. This in turn increases the contact time for the air flowing through the filter which increases the efficiency of the filtering for a given size of filter. Therefore, the deodorising action is increased.

Preferably, the cavity is closed. This maximises the improvement in the filtering efficiency.

According to a second aspect of the present invention, there is provided a toilet seat comprising:

an annular seat member;

two air filters for deodorising foul air from a toilet pan, each arranged in ducting extending around the annular seat member between an inlet for receiving

four air from the toilet pan and an outlet; and

fan means arranged in the ducting for creating separate air flows in parallel over the two air filters.

Thus according to the second aspect of the present invention there are two air filters extending around the annular seat member.

The fact that the air filters extend around the annular seat member provides the same advantage as described above with reference to the first aspect of the present invention.

In addition, the provision of two air filters provides a surprising advantage, as compared to the provision of a single filter of equivalent size to the total size of the two air filters. As there is a separate airflow over each filter, the deodorising action is improved, as compared to the use of such a single filter. In particular, it is possible to reduce the speed of the airflow created over each of the air filters, because each of the air filters may be shorter than a single air filter acting in isolation. This increases the contact time for the air flowing over each filter which increases filtering efficiency and hence the deodorising action.

Preferably, the filters, ducting and fan means are symmetrically arranged in the toilet seat to provide a balanced air flow through both filters. This maximises the filtering efficiency, because it allows the filtering action of both filters to be optimised.

Preferably, the fan means is arranged to blow air through the air filters and the toilet seat further comprises an air splitter arranged to split air blown by the fan into the separate air flows. This is a particularly convenient arrangement to create the separate air flows. This arrangement makes it easy to arrange the filters, ducting and fan means symmetrically.

In summary, therefore, both the first and second aspects of the present invention provide toilet seats which increase the filtering efficiency by increasing the contact time for air flowing over filters arranged around an annular seat member of a toilet seat, thereby increasing the deodorising action. The first and second aspects of the present invention may be used in combination to obtain both improvements in

deodorising action. In this case, there is preferably a common cavity in accordance with the first aspect of the present invention communicating with the ducting for both air filters. This provides a balanced airflow in the ducting for each air filter, thereby maximising the improvement in deodorising action provided by the cavity.

Preferably, in toilet seats according to the first or second aspect of the invention, the air filter comprises activated carbon. Particular advantage is achieved by the air filter comprising activated carbon dispersed in a porous support. Such an air filter is of general applicability. Therefore, according to a third aspect of the present invention, there is provided a toilet seat comprising an annular seat member in which is mounted at least one air filter for deodorising four air from a toilet pan, at least one air filter comprising activated carbon dispersed in a porous support.

As is known in the art, activated carbon is particularly suitable as a filter for deodorising foul air from a toilet pan. According to the third aspect of the present invention, the activated carbon is dispersed in a porous support. This improves the efficiency of the filter because the foul air can pass through the porous support and flow around the activated carbon dispersed therein. This maximises the contact between the foul air and the activated carbon, thereby maximising the efficiency of the filter. The porous support also holds the activated carbon in place. This limits conglomeration of the activated carbon. It also prevents the activated carbon from rattling when the toilet seat is moved.

In general, any porous support may be used, but preferably the porous support is foam.

Preferably, the activated carbon is formed as pellets, but alternatively the carbon may have be a finer powder.

According to a fourth aspect of the present invention, there is provided a toilet seat comprising:

a toilet seat member comprising a base and a cover fixed together; and

at least one air filter for deodorising foul air from a toilet pan arranged in ducting extending around the annular seat member between in inlet for receiving foul air from the toilet pan and an outlet,

wherein, the ducting has side walls extending around the annular seat member and formed integrally with the base.

It is advantageous to arrange the air filter in ducting extending around the annular seat member to maximise the deodorising action for the reasons described above with reference to the first aspect of the present invention.

According to the fourth aspect of the present invention, the annular seat member is formed from a base and a cover fixed together. This simplifies manufacture as the base and the cover may be manufactured separately and subsequently fixed together. In use, the base forms the lower surface of the annular seat member and the cover forms the upper surface on which a person sits. The ducting formed integrally with the base can cause marks to be visible on the external (lower) surface of the base. The fourth aspect of the present invention, by means of the ducting being formed on the base, rather than the cover, prevents any such marks being visible on the cover which is most often visible in use of the toilet seat. Therefore, this aspect of the present invention allows the ducting of the filter system to be implemented without significant detriment to the appearance of the manufactured toilet seat.

This aspect of the present invention is particularly applicable when the base and cover are moulded, for which there is a particular risk of the ducting causing moulding marks on the external surface of the element with which it is integrally formed.

To allow better understanding, embodiments of the present invention will now be described by way of non-limitative example with reference to the accompanying drawings, in which:

Fig. 1 is a bottom plan view of a first toilet seat;

Fig. 2 is an exploded view of the first toilet seat;

Fig. 3 is a perspective view of the assembled base of the first toilet seat excluding the cover;

Fig. 4 is a top plan view of the assembled base of the first toilet seat excluding the cover; and

Fig. 5 is a cross-sectional view of a filter cartridge for mounting in the seat member, the cross-section being taken across the seat member along the line V-V in Fig.4.

Fig. 6 is a bottom plan view of a second toilet seat;

Fig. 7 is an exploded view of the second toilet seat;

Fig. 8 is a perspective view of the assembled base of the second toilet seat excluding the cover; and

Fig. 9 is a top plan view of the assembled base of the second toilet seat excluding the cover.

Figs. 1 to 5 illustrate a first toilet seat 1 which embodies all the aspects of the present invention. Accordingly, the various aspects of the present invention and the preferred features thereof may be freely combined together.

As best seen in Figs.1 and 2, the toilet seat 1 comprises an annular seat member 2 and a lid member 3 which have a conventional external form. The seat member 2 and lid 3 have respective hinge portions 4 and 5 of a conventional construction to couple the lid 3 pivotally to the seat member 2. The toilet seat 1 may be pivotally mounted to a toilet pan by the hinge formed by hinge portions 4 and 5 in a conventional manner with the seat member 2 extending around the rim of the toilet pan and supported on lugs 28 protruding from the seat member 2. The lid 3 does not assist in the deodorising function of the toilet seat 1 and need not be present, although such lids 3 are conventionally sold together with a seat member 2.

The seat member 2 is formed from two parts, namely a base 6 and a cover 7 which are fixed together. The base 6 has an annular planar wall 8 which in use forms the lower surface of the seat member 2, the lugs 28 protruding therefrom.

The cover 7 comprises an annular arched wall 9 arched over the base wall 8 of the base 6 to form a cavity therebetween. The arched wall 9 has annular, inner and outer side portions 10 and 11 on either side of a curved upper portion 12 but other arched shapes are possible. The hinge portion 4 of the seat member 2 is integrally formed with the cover 7 at a rearward position around the seat member 2.

The base wall 8 has integrally formed walls 13 and 27 protruding from the

base wall 8 under the cover 7 and extending in pairs around portions of the seat member 2 to form ducting 22 and a cavity 25 as will be described in more detail below. The base 6 and cover 8 are manufactured by moulding, for example from plastic, in a conventional manner. The walls 13 and 27 can leave visible marks on the external, (that is lower) surface of the base wall 8 of the base 6 as a result of the moulding process. However, as there are no equivalent walls forming ducting or a cavity on the inside of the arched wall 9 of the cover 7, there are no such marks formed on the outside, (that is upper) surface of the cover 7. As it is the cover 7 which is seen in normal use, formation of the walls 13 and 27 integrally with the base 6 instead of the cover 7 is not to the detriment of the appearance of the seat member 2.

Two air filter cartridges 14 are mounted in the seat member 2 on opposite sides thereof. The air filter cartridges 14 are removable from the seat member 2 through respective apertures 15 in the base wall 8 of the base 6. Each of the air filter cartridges is constructed as follows, as best seen in Fig.5. The cartridges 14 contain an air filter 16 in the shape of an elongate block extending around the seat member 2. The air filter 16 is encased in a rigid casing 17 which is moulded, for example from plastic. The casing 17 has a planar wall 18 which fits flush with the base wall 8 of the base 6 in the aperture 15. The casing 17 further has upper walls 19 extending from the planar wall 18 around the filter 16. In particular, the upper walls 19 comprise an inner side wall 34 and an outer side wall 35, both extending from the planar wall 18 on opposite sides of the filter cartridge 14, and a top wall 36 joining the side walls 34 and 35 opposite the planar wall 18. The casing 17 is open at each end along the length of the filter 16 around the seat member 2 and has a plurality of openings 37 in the planar wall 18 and a plurality of openings 38 in the top wall 36 of the upper walls 19 to allow flow of air through the casing 17 to the filter 16.

The filter 16 comprises a foam support in which is dispersed activated carbon in the form of coated pellets, which are in themselves of a conventional form. The activated carbon filters air passing through the filter 16 by absorbing odorous compounds such as sulphides and ammonia. The foam support allows the flow of

foul air around the dispersed activated carbon, thereby providing a high degree of contact between the air and the activated carbon which assists the filtering. The foam support also holds the activated carbon in place dispersed through the filter 16, thereby preventing the activated carbon both from conglomerating together and from rattling. Provided it is porous, the support could take other forms, for example a fibrous or honeycomb material. The activated carbon could take other forms, for example a powder, but the advantage of pellets is that their size limits their movement through the support.

The filters 16 are surrounded in the casing 17 by a gas-permeable, fluid-impermeable membrane 20. The membrane 20 protects the filter 16 from fluid which might splash through the openings 37 in the planar wall 18 when in use on a toilet pan, whilst allowing foul air to pass through to the filter 16 to allow filtration.

The seat member 2 further includes an inlet 20 in the arched wall 9 of the cover 7, positioned on the inner side of the seat member 2 so that the inlet 20 is open to the toilet pan in normal use. The inlet 20 is at a rearward position around the seat member 2, that is aligned with the hinge portion 4 of the seat member 2. The inlet 2 is covered by a grille 21 which may have louvred openings to limit the ingress of fluid which may splash on the grille 21 in use of the toilet seat 1 on a toilet pan.

As best seen in Figs. 3 and 4, the walls 13 of the base 6 are formed in a pair and extend around the seat member 2 to form side walls of respective ducting 22 from the inlet 20 to each of the filter cartridges 14. The ducting 22 is open to the filter 16 through the open end of the filter casing 17 and the openings 38 in the top wall 36 of the upper wall 19 of the filter casing 17. Therefore, the openings 37 in planar wall 18 positioned in the aperture 15 in the base 6 adjacent the filter 16 act a an outlet for the ducting 22. As the openings 37 are formed in the planar wall 18 which is the lower surface in use, the openings 37 open into the toilet pan (not shown). The location of the inlet 41 in the lower surface of the toilet seat 2 has the benefit of providing a smoother flow through the seat member 2 than is the case for the inlet 20 of the first toilet seat formed on the inner side of the seat member 2.

A fan 23 is disposed in the seat member 2 inside the inlet 20. As the fan 23

at a position around the seat member 2 aligned with the hinge portion 4, this minimises the apparent weight of the fan 23 when the toilet seat 2 is lifted around the hinge formed by the hinge portions 4 and 5.

The fan 23 is powered by a battery 29 arranged in the seat member 2 under the cover 7, but outside the ducting 22 formed by the walls 13. Alternatively, the fan 23 is powered by an external battery (not shown) connected through terminal 33.

The fan 23 is electrically connected by a wire 30 to a microswitch 31 to control operation of the fan 23. The microswitch 31 is disposed at the front of the seat member 2 opposite the hinge portions 4, and is disposed inside the seat member 2 under the cover, but outside the cavity 25 formed by the walls 27. The microswitch 31 has a plunger 32 protruding through the planar wall 8 of the base 6 to the same level as the lugs 28, so that the plunger 32 is in contact with the rim of the toilet pan when the seat member 2 is supported on the lugs 28. The microswitch 31 is arranged to be switched on by the weight of a person sitting on the seat member 2 and to be switched off when the person stands up. The microswitch 31 therefore effectively acts as a sensor for detecting a person sitting on the seat member 2 and could be replaced by other forms of sensor. The positioning of the microswitch 31 at the front of the seat member 2 maximises its sensitivity because the seat member 2 pivots about the hinge portions 4 at the rear.

When the microswitch 31 is switched on, the fan 23 is caused to operate. The fan 23 stops operating when the microswitch 31 is switched off, or optionally a predetermined time after the microswitch 31 is switched off.

The fan 23 is directed across the seat member 2 to draw foul air from the inlet 20 and blow it in a direction radially outwardly across the seat member 2. The base 6 has an integrally formed air splitter 24 disposed outwardly of the fan 23 against which air blown by the fan 23 is incident. The air splitter 24 comprises a pair of arcuate walls 26 meeting at an edge 25 facing the fan 23. The arcuate walls 26 curve in opposite directions away from the edge 25 to direct the portion of the air blown by the fan 23 incident on each respective arcuate wall 26 in an opposite direction around the toilet seat 1. In use, the air blown by the fan 23 is split at the

edge 25 and guided by the arcuate walls 26 of the air splitter 24 sideways around the seat member 2 to create separate air flows in parallel in the ducting 22 for each of the two filters 16.

The fan 23 has sufficient power to blow air from the inlet 21 through the ducting 22 and the filters 16, and then out of the outlet formed by the openings 37 in the planar wall 18 of the filter casing 17 which acts as the outlet for the ducting 22. However, the power of the fan 23 is selected to be at a minimal level to achieve this, so as to minimise the speed of the airflow through the ducting 22 and filters 16. This has the benefit of increasing the contact time between the foul air and the filters 16 which in turn improves the efficiency of the filters 16 in deodorising the foul air. By the use of two filters 16, the air flow created through the ducting 22 for each filter 16 may be slower than the air flow which would need to be created to force air through the entire length of a single filter of equivalent size to the two filters 16 together. This relative reduction in the speed of the air flow enhances the filtering efficiency as compared to such a single filter.

The walls 27 of the base 6 are formed as a pair and extend around the front of the seat member 2, to form the side walls of a cavity 25 which extends around the seat member between the filters 16 and is open in common to the ducting 22 for each of the filters 16. The cavity 25 is therefore outside of the direct air flow path along the ducting 22 between the inlet 20 and the outlet formed by the openings 37 in the planar wall 18 of the filter casing 17. However, the presence of the cavity 25 reduces the back pressure on the opposite side of the filters 16 from the fan 23, where the cavity 25 is open to the ducting 22. This increases the contact time between the foul air and the filters 16 which in turn increases the filtering efficiency as compared to the ducting 22 being closed at the downstream end of the filter 16. The cavity 25 is closed to maximise this effect. In addition, the fact that the cavity 25 communicates in common with the ducting 22 for each of the filters 16 balances the separate air flows passing through the two filters 16. This serves to further enhance the effect of the cavity 25. To this end, the air splitter 24, the ducting 22, the filter 16 and the cavity 25 on each side of the seat member 2 are symmetrical to equalise the separate

air flows and the filtering action of the two filters 16. This symmetrical arrangement allows the filtering efficiency to be optimised by optimising the filtering action of each filter 16.

In use, when a person sits on the seat member 2, this switches the microswitch 31 on causing the fan 23 to operate. The fan 23 draws foul air from the toilet pan in through the inlet 20 and blows it against the air splitter 24 which splits the air into separate air flows which pass through the ducting 22 for each filter 16. The foul air passes through to both of the filters 16 which filter the air to deodorise it. The thus deodorised air flows out of the seat member 2 through the outlet formed by the perforated planar wall 18 of the filter casing 17 back into the toilet pan (not shown). The toilet seat 1 provides effective deodorising action. This is achieved even without a seal between the toilet seat 1 and the toilet pan (not shown).

Figs. 6 to 9 illustrate a second toilet seat 40 which also embodies all the aspects of the present invention. The second toilet seat 40 has the same structure as the first toilet seat 1 except for some modifications which will be described in detail below. The common features are given the same reference numerals and for brevity a description thereof is not repeated.

The first modification is the location of the inlet. Instead of the inlet 20 of the first toilet seat 1, the second toilet seat 40 has an inlet 41 formed in the annual planar wall 8 of the base 6 which in use forms the lower surface of the seat member 2. In particular, the inlet 41 is formed as a plurality of inlet openings 42 formed in a protrusion 43 of the annular planar wall 8 which protrudes radially inwardly. The inlet 41 is at the same position around the seat member 2 as the inlet 20 of the first toilet seat 1, that is at a rearward position.

The second modification is the number of fans. Instead of the single fan 23 of the first toilet seat 1, the second toilet seat 40 has a pair of fans 44 arranged adjacent one another. The pair of fans 44 are aligned in the same direction as the fan 23 of the first toilet seat 1, that is directed across the seat member 2 to draw foul air from the inlet 41 and blow it in a direction radially outwardly across the seat member 2 towards the air splitter 24. The use of two fans 44 has the capability of providing a

higher flow rate and hence of improving the deodorising action of the filters 16. However, as efficient filtering requires a sufficient contact time between the foul air and the filters 16, the flow rate should not exceed an optimum value for the filter 16 above which the filtering efficiency is reduced. The optimum flow rate and hence the optimum number and power of the fans 23 or 44 can be determined by routine testing.

The third modification is the location of the outlet. The second toilet seat 40 does not have openings 37 in the planar wall 18 of the filter casing 17. Instead, the outlet is formed by a plurality of openings 45 formed in the outer side portion 11 of the arched wall 9 of the cover 7, adjacent each filter cartridge 14 on the respective outer sides of the seat member 2. In addition, to allow air to flow from the filter 16 to the opening 45, the filter cartridges 14 are each formed with a plurality of openings 46 in the outer side wall 35 of the upper walls 19 of the casing 17. To prevent the air flow from bypassing the filter 16, the edge 47 of the upper walls 19 of the casing 17 between the outer side wall 35 and the top wall 36 may seal against the cover 7 of the seat member 2.

The openings 45 act as an outlet for the ducting 22. Due to the location of the openings 45 on the outer side of the cover 7, the outlet formed by the openings 45 open outside the toilet pan (not shown). Therefore, the location of the outlets 45 in the second toilet seat 40 can provide an advantage, as compared to the first toilet seat 1, of smoothing the flow through the ducting 22 and the filter 16 which can improve the filtering efficiency. In contrast, the location of the openings 37 in the first toilet seat 1 results in the air flowing out of the openings 37 to cause a degree of turbulence within the toilet pan (not shown) which can affect the airflow into the inlet 20. The location of the outlet formed by the openings 45 in the second toilet seat 40 avoids any such turbulence.

The fourth modification is the location of the battery. In the second toilet seat 40, power is supplied by a battery pack 47 which is replaceably mounted in a housing 48 formed integrally with the lid 3 of the toilet seat 1. The battery pack 47 is connected to the pair of fans 44 by a wire 49 which runs across the lid 3 and

externally between the lid 3 and the seat member 2, in which portion the wire 49 is sufficiently flexible to accommodate the relative of movement of the seat member 2 and the lid 3. The lid of the toilet seat 3, in a conventional manner, gently curves to define a recess in the lower surface where the battery pack 47 may be easily accommodated. Therefore, the location of the battery pack 47 mounted in the lid 3 allows accommodation of a relatively large battery pack 47.

The second toilet seat 40 operates in the same manner as the first toilet seat 1 as described in detail above.

Whilst the second toilet seat 40 has several modifications as compared to the first toilet seat 1, the modifications could be applied to the first toilet seat 1 individually or in any combination.

Claims

1. A toilet seat comprising:

an annular seat member;

at least one air filter for deodorising foul air from a toilet pan arranged in ducting extending around the annular seat member between an inlet for receiving foul air from the toilet pan and an outlet disposed adjacent the air filter; and

fan means arranged in the ducting for creating air flow along the ducting through the air filter,

wherein the ducting communicates with a cavity on the opposite side of the air filter from the fan means.

2. A toilet seat according to claim 1, wherein the cavity is closed.

3. A toilet seat according to claims 1 or 2, wherein the toilet seat comprises two air filters, the fan means is arranged to create separate air flows over the two air filters, and the ducting for both air filters communicates with a common cavity.

4. A toilet seat according to any one of claims 1 to 3, wherein the toilet seat member comprises a base and a cover fixed together and the ducting has side walls formed integrally with the base.

5. A toilet seat according to any one of claims 1 to 4, wherein the base and the cover are moulded.

6. A toilet seat according to any one of claims 1 to 5, wherein the at least one air filter is disposed in a cartridge removably mounted in the annular seat member, the outlet of the ducting being formed in a wall of the cartridge.

7. A toilet seat comprising:

an annular seat member;

two air filters for deodorising foul air from a toilet pan, each arranged in ducting extending around the annular seat member between an inlet for receiving foul air from the toilet pan and an outlet; and

fan means arranged in the ducting for creating separate air flows in parallel over the two air filters.

8. A toilet seat according to claim 7, wherein the fan means is arranged to blow air through the air filters and the toilet seat further comprises a flow splitter arranged to split air blown by the fan into the separate air flows.

9. A toilet seat according to claim 8, wherein the fan means is arranged to blow air in a direction radially across the seat member.

10. A toilet seat according to claim 9, wherein the fan means is arranged to blow air in a direction radially outwardly across the seat member.

11. A toilet seat according to claim 9 or 10, wherein the flow splitter comprises a pair of arcuate surfaces meeting at an edge which faces the fan means and curved in opposite senses to deflect air blown by the fan means around the toilet seat in opposite directions as said separate air flows.

12. A toilet seat according to any one of claims 7 to 11, wherein the filters, ducting and fan means are symmetrically arranged in the toilet seat to provide a balanced air flow through both filters.

13. A toilet seat according to any one of claims 7 to 12, wherein the ducting on the opposite side of both air filters from the fan means communicates with a common cavity.

14. A toilet seat according to any one of claims 7 to 13, wherein the toilet seat member comprises a base and a cover fixed together and the ducting has side walls formed integrally with the base.

15. A toilet seat according to claim 14, wherein the base and the cover member are moulded.

16. A toilet seat comprising an annular seat member in which is mounted at least one air filter for deodorising foul air from a toilet pan, at least one air filter comprising activated carbon dispersed in a porous support.

17. A toilet seat according to claim 16, wherein the porous support is foam.

18. A toilet seat according to claim 16 or 17, wherein the porous support is surrounded by a gas-permeable, fluid-impermeable membrane.

19. A toilet seat according to any one of claims of 16 to 18, wherein the air filter is mounted in a casing which is removable from the annular seat member.

20. A toilet seat according to any one of claims of 16 to 19, wherein the activated carbon is formed as pellets.

21. An air filter for mounting in a toilet seat to deodorise foul air from a toilet pan, the filter comprising a porous support holding activated carbon dispersed through the support.

22. An air filter according to claim 21, wherein the porous support is foam.

23. An air filter according to claim 21 or 22, wherein the porous support is surrounded by a gas-permeable, water-impermeable membrane.

24. An air filter according to any one of claims 21 to 23, further comprising a casing mounting the air filter.

25. An air filter according to any one of claims 21 to 24, wherein the activated carbon is formed as pellets.

26. A toilet seat comprising:

a toilet seat member comprising a base and a cover fixed together; and

at least one air filter for deodorising foul air from a toilet pan arranged in ducting extending around the annular seat member between an inlet for receiving foul air from the toilet pan and an outlet,

wherein, the ducting has side walls extending around the annular seat member and formed integrally with the base.

27. A toilet seat according to claim 26, wherein the base and the cover are moulded.

Fig.1.

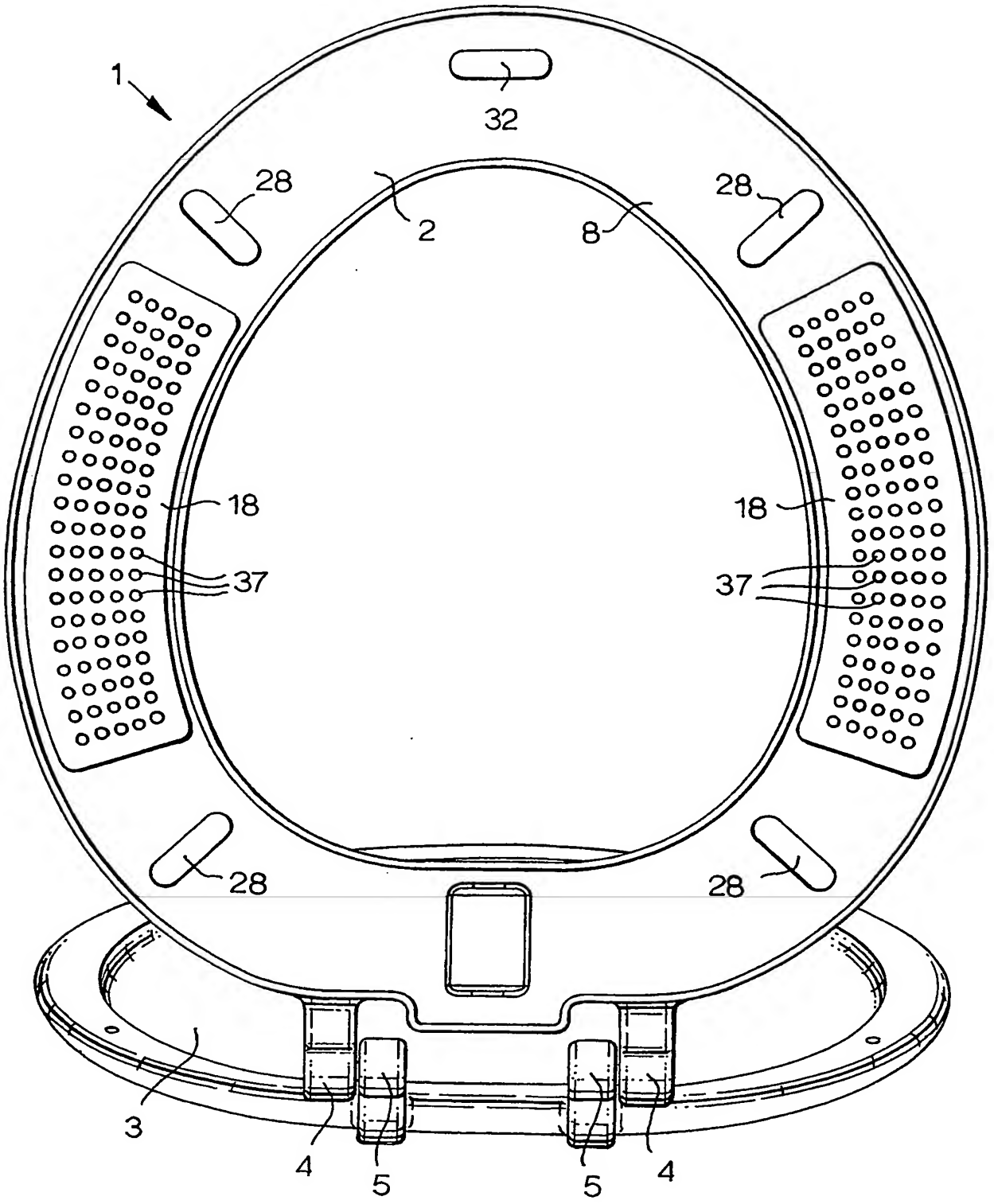


Fig.2.

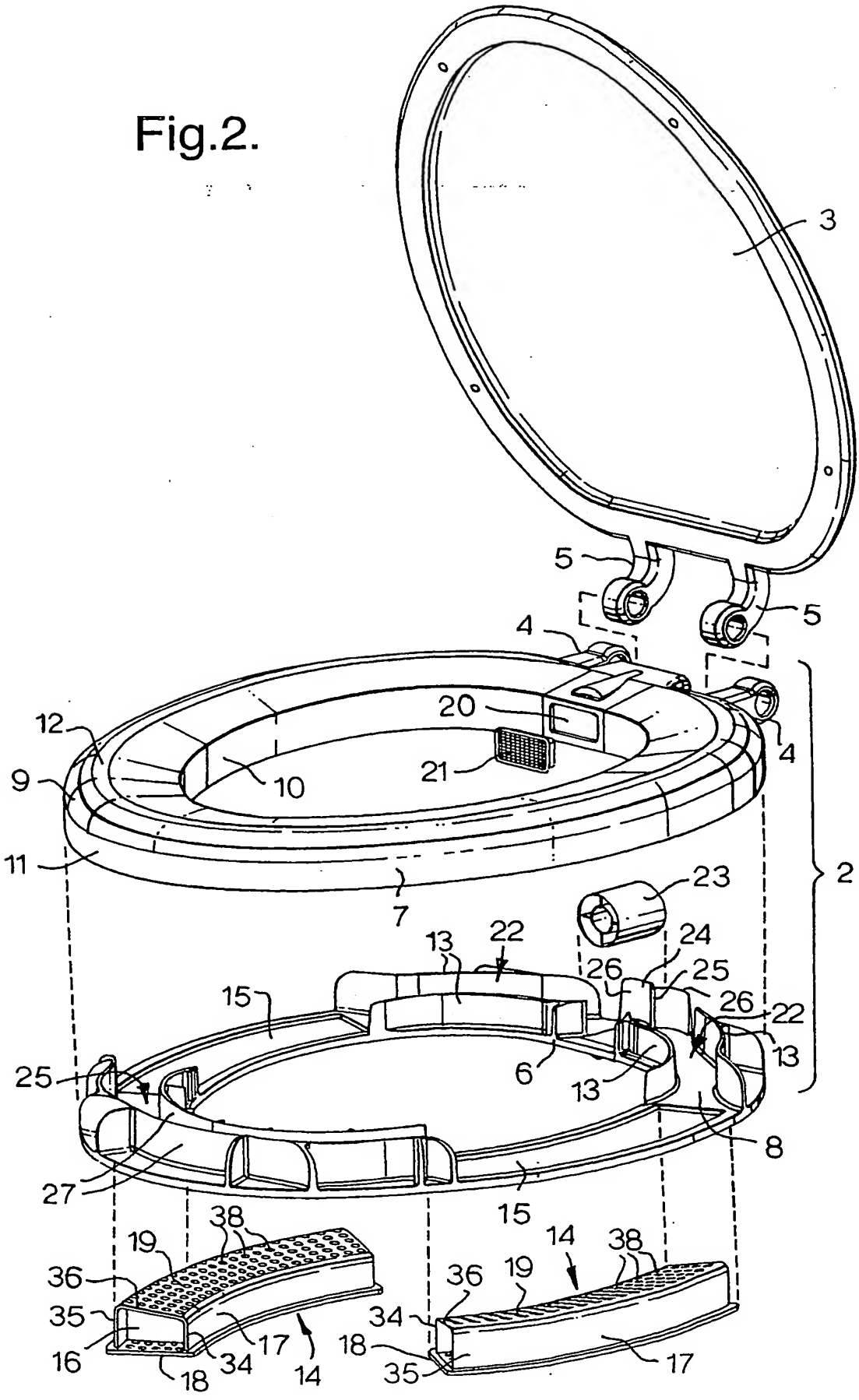


Fig.3.

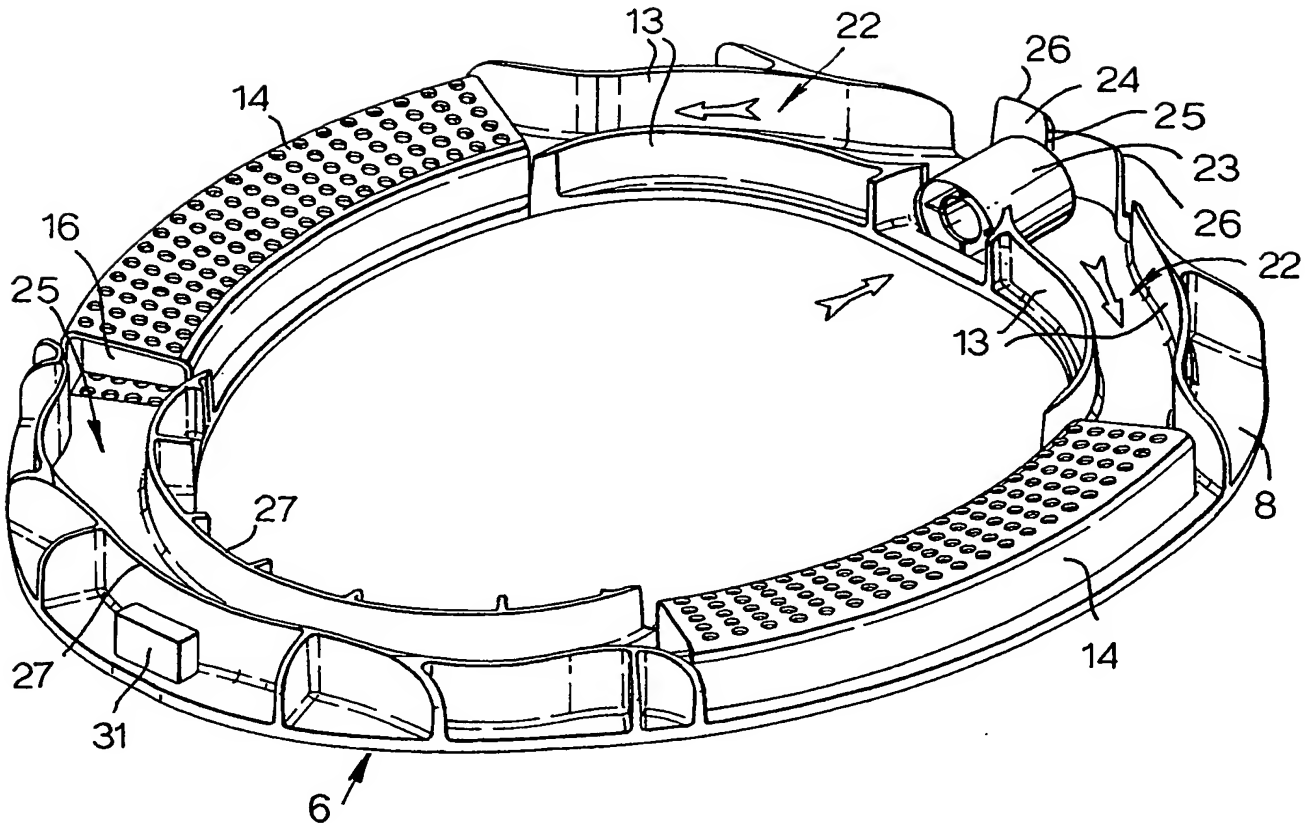


Fig.4.

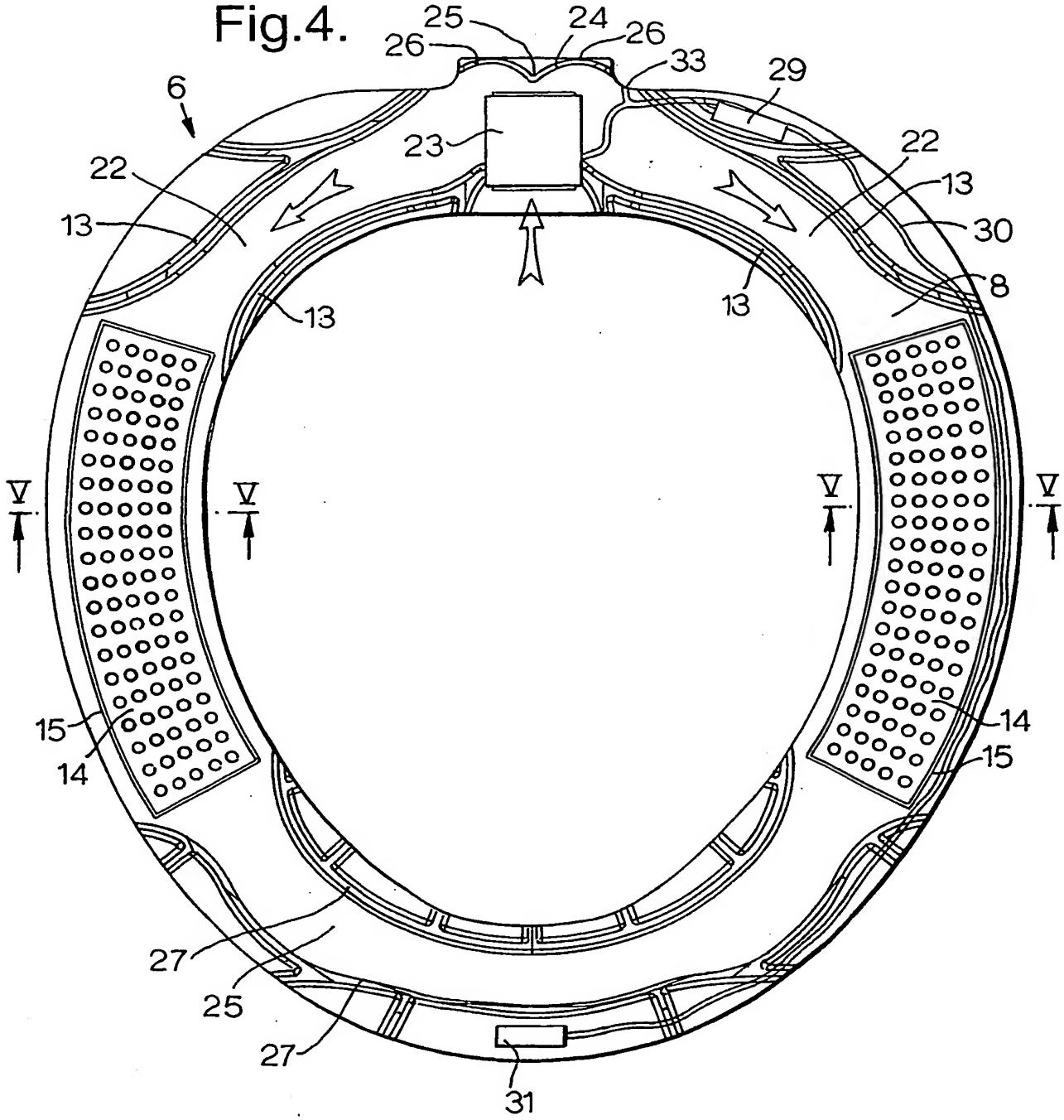


Fig.5.

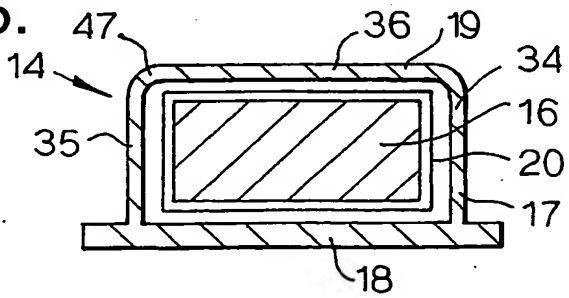


Fig.6.

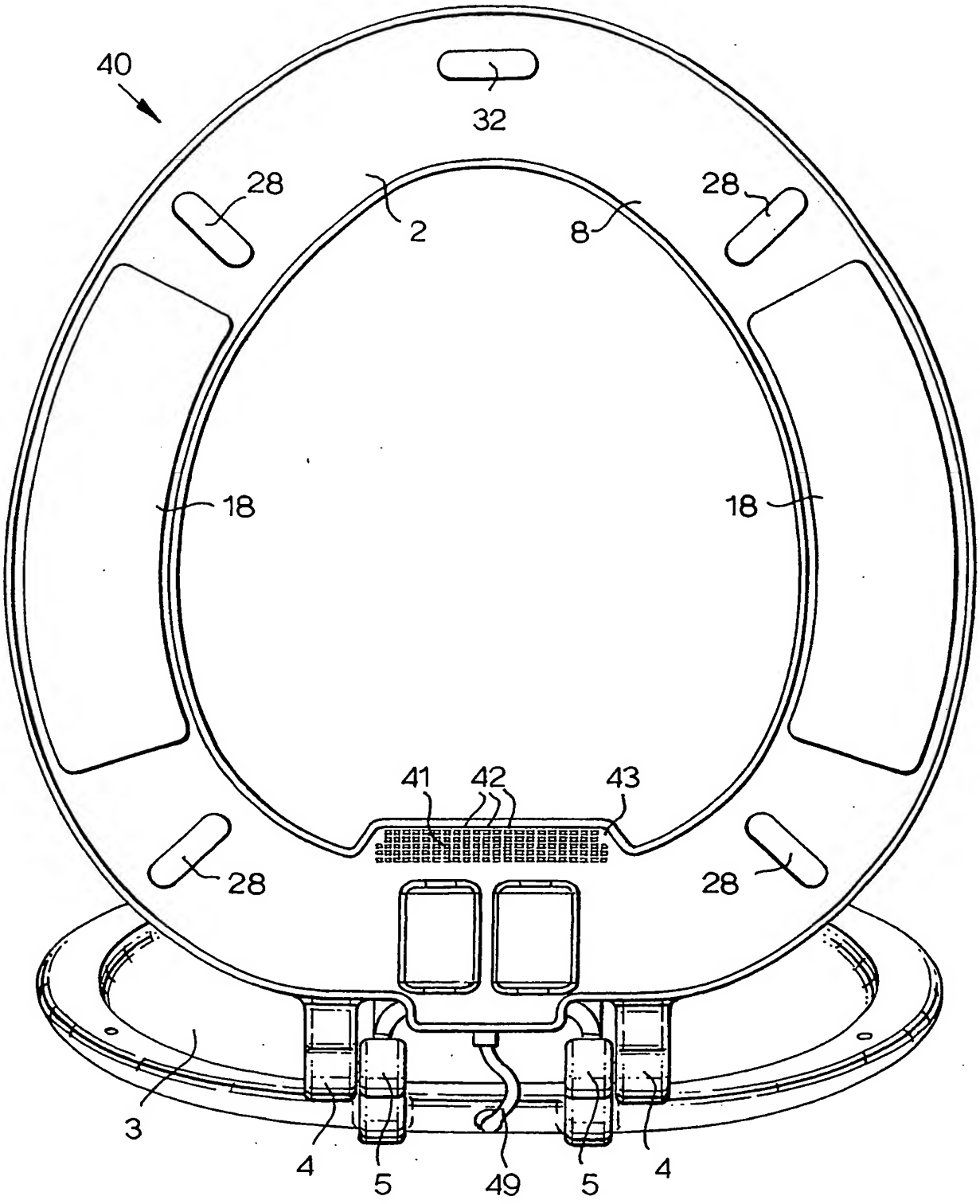


Fig.7.

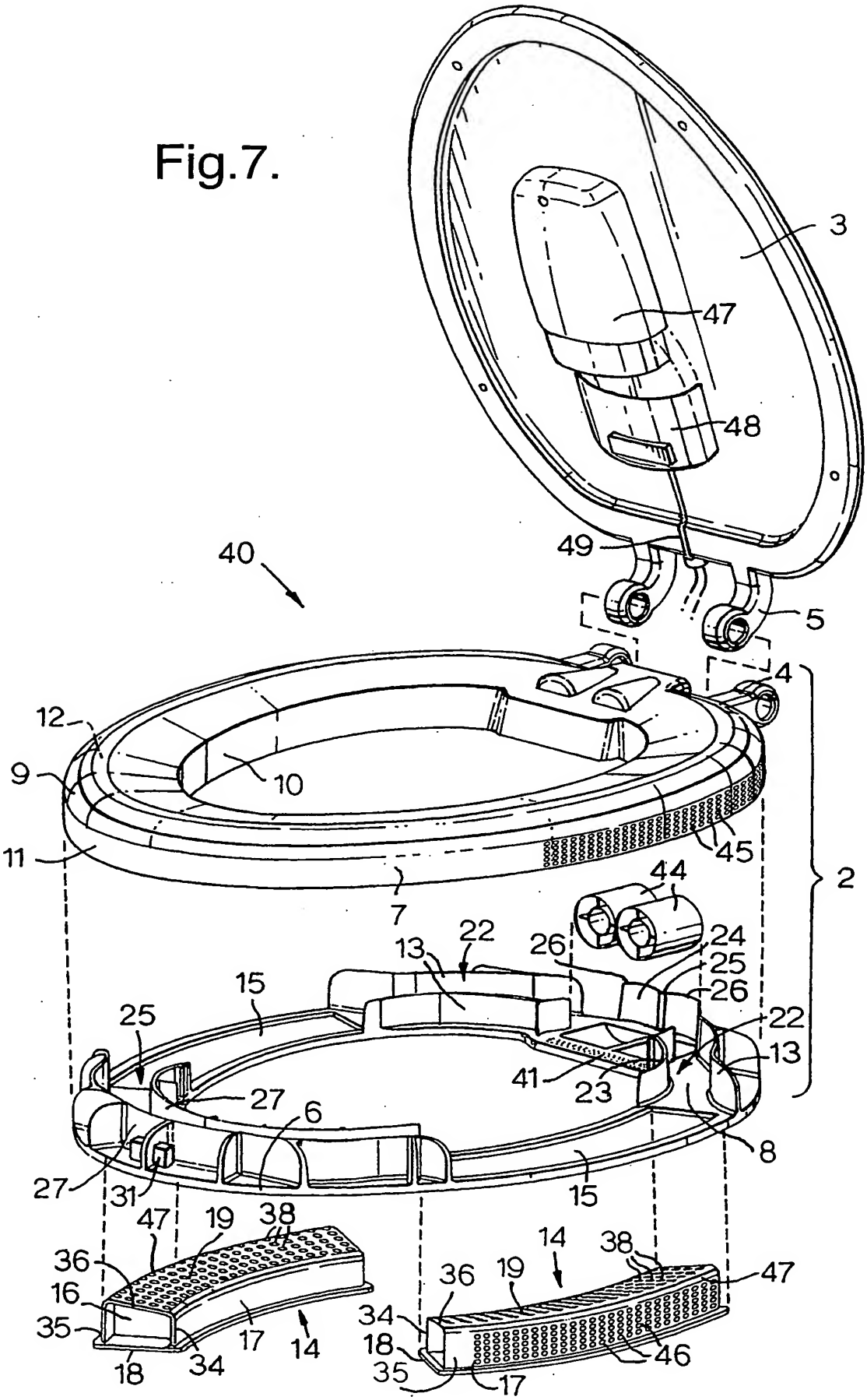


Fig.8.

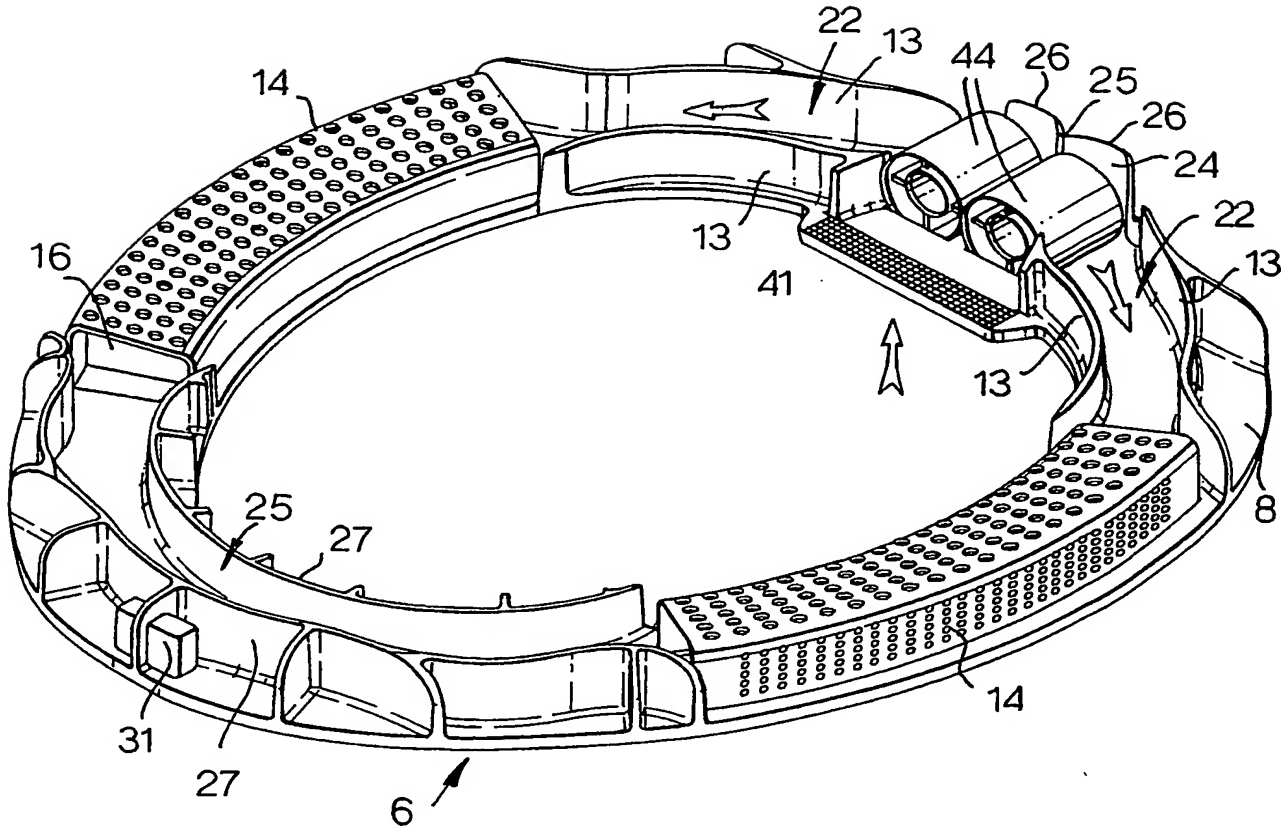
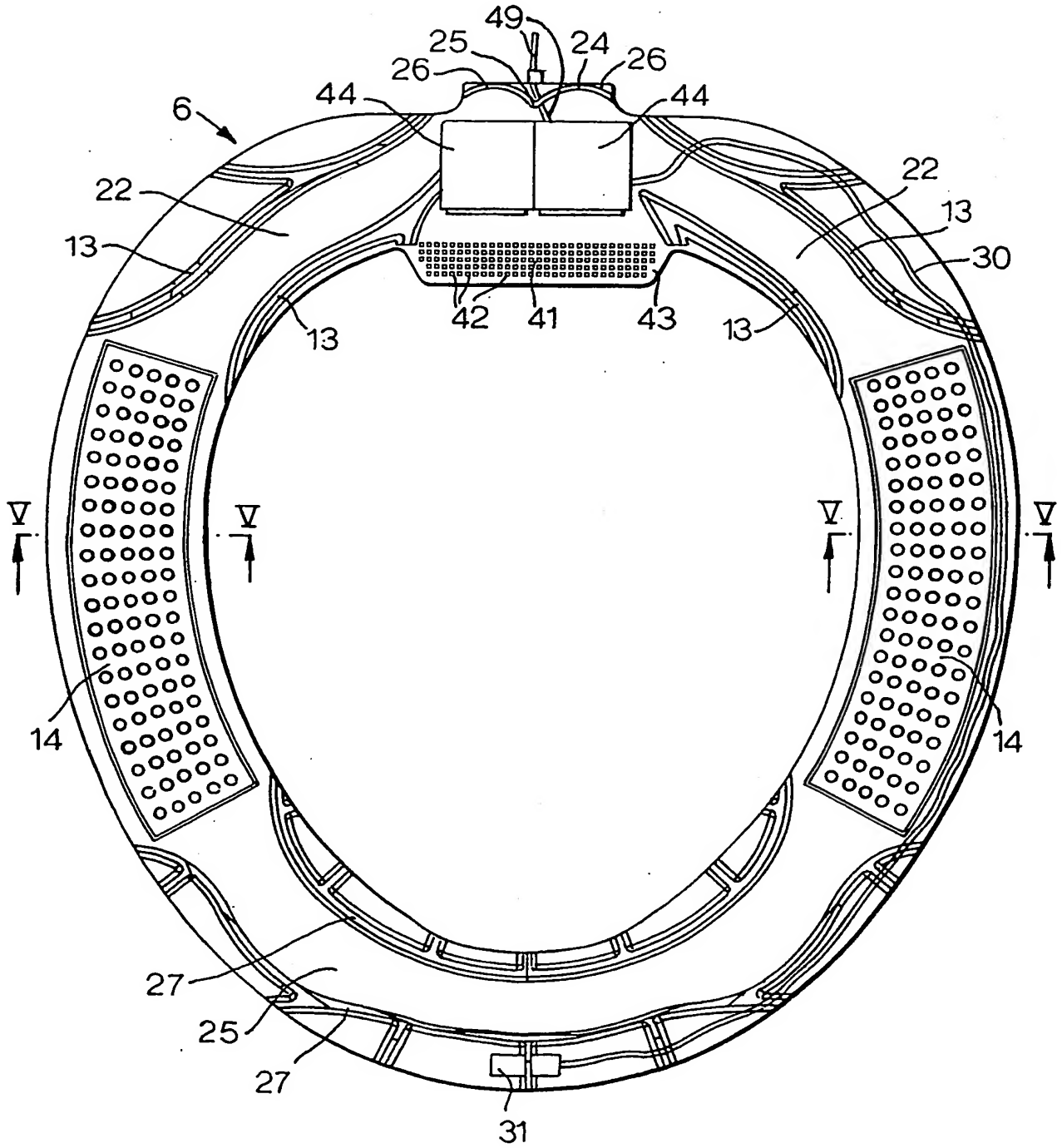


Fig.9.



INTERNATIONAL SEARCH REPORT

Int ional Application No
PCT/GB 02/05020

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 A47K13/30

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 A47K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 079 783 A (HALETSKY CHRIS A ET AL) 14 January 1992 (1992-01-14)	1,4,5,7, 12, 14-16, 19,21, 24,26,27
A	the whole document	3,6
X	US 6 163 893 A (LO LARRY) 26 December 2000 (2000-12-26)	16,19, 21,24
A	the whole document	1,7,26
A	EP 0 692 582 A (MARQUES SIMON JOAQUIN NICETO) 17 January 1996 (1996-01-17) the whole document	1,7,16, 21,26

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
10 January 2003	21/01/2003

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Vrugt, S

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/GB 02/05020

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